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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* NAOKI SUGIURA,
AKIHIKO FUKUSHIMA, and SHINOBU FUJIE

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Appeal 2015-005907
Application 12/500,413[1]
Technology Center 1700

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Before JEFFREY T. SMITH, N. WHITNEY WILSON, and JEFFREY R. SNAY, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

This is an appeal under 35 U.S.C. § 134 from a final rejection of claims 1, 3, 9, and 10. We have jurisdiction under 35 U.S.C. § 6.

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[1] The real party in interest is Mitsubishi Rayon Co, Ltd. (App. Br. 1).

Appellants' invention is generally directed to a thermoplastic resin composition comprising polypropylene and a cut carbon fiber bundle. According to the Specification, the carbon fiber bundle is obtained by pre-sizing the carbon fiber bundle, drying the pre-sized carbon fiber bundle and sizing the dried pre-sized carbon fiber bundle. Spec. 4–5. Claim 1 illustrates the subject matter on appeal and is reproduced from the Appeal Brief below:

> 1. A thermoplastic resin composition comprising:
>
> polypropylene; and
>
> a cut carbon fiber bundle having fibers which are presized and sized;
>
> wherein
>
> the thermoplastic resin composition is obtained by kneading the cut and dried carbon fiber bundle and the polypropylene, and
>
> the cut carbon fiber bundle is obtained by a process, comprising:
>
> > pre-sizing a carbon fiber bundle with 0.1 to 2.0 wt% relative to the total carbon fiber bundle, of a pre-sizing agent consisting of an epoxy resin;
> >
> > drying the pre-sized carbon fiber bundle;
> >
> > sizing the dried presized carbon bundle with 0.3 to 5 wt% relative to the total carbon fiber bundle of at least one sizing agent to obtain a moist sized fiber bundle;
> >
> > cutting the moist sized carbon fiber bundle to a prescribed length; and
> >
> > drying the moist carbon fiber bundle cut to the prescribed length to obtain the cut carbon fiber bundle having fibers which are presized and sized;
>
> wherein
>
> the carbon fiber bundle consists of a plurality of single carbon fibers which comprise

> a plurality of wrinkles on their surface, and a vertical difference between a highest portion and a lowest portion in a region defined by 2 μm of circumferential length x 1 μm of fiber axial direction length of the single fibers is 40 nm or more, and the at least one sizing agent comprises:
>
> a polymer having a main chain comprising polypropylene, polyethylene or a copolymer of propylene and ethylene formed of carbon-carbon bonds, comprising an acid group in at least a part of side chains or at least a part of main chain ends, and an acid value of the polymer is in the range from 23 to 120 mg KOH/gas measured in accordance with ASTM D1386; or
>
> a polymer having a main chain comprising polypropylene, polyethylene or a copolymer of propylene and ethylene formed of carbon-carbon bonds, comprising at least one of an epoxy group or an ester group in at least a part of side chains or at least a part of main chain ends, which is obtained by copolymerization of a vinyl monomer having an epoxy or ester group with propylene, ethylene or a mixture, thereof.

Appellants (*see* App. Br., *generally*) request review of the following rejections from the Examiner's Final Office Action (Final Act. 7–16):

I. Rejection of claims 1, 3, and 9 under 35 U.S.C. § 103(a) as unpatentable over Hirai et al. (US 5,227,238, issued July 13, 1993) ("Hirai") in view of Nakao et al. (US 5,124,010, issued June 23, 1992) (Nakao) in view of Hasegawa et al. (JP 06-107442, published Apr. 19, 1994) ("Hasegawa") and further in view of lkeda et al. (US 6,569,523 B2, issued May 27, 2003) ("Ikeda").

II. Rejection of claim 10 under 35 U.S.C. § 103(a) over Hirai, Nakao, Hasegawa, Ikeda and further in view of Kume et al. (JP 05-261729, published Oct. 12, 1993) ("Kume").

OPINION

Upon consideration of the evidence in this appeal record in light of the respective positions advanced by the Examiner and Appellants, we determine that Appellants have not identified reversible error in the Examiner's determination that the applied prior art would have rendered the subject matter recited in claims 1, 3, 9, and 10 obvious to one of ordinary skill in the art within the meaning of 35 U.S.C. § 103(a). Accordingly, we sustain the Examiner's § 103(a) rejections of the above claims for the reasons set forth in the Final Action and the Answer. We add the following.

*Rejection I*[2]

Appellants argue Hirai does not disclose or suggest an advantage to application of the pre-size and size coatings according to the sequential order of claim 1. (App. Br. 4–6). Appellants further argue Hirai never discloses application of an epoxy pre-size dried coating and subsequent application of a size coating. (App. Br. 6). Appellants argue Hirai includes 33 kinds of resins thus, the Examiner utilized hindsight as the basis for selecting the combination of an epoxy pre-size followed by a polyolefin grafted with maleic acid. (App. Br. 6). Appellants argue the Examiner's reason for selecting polypropylene from the disclosure of Nakao was based on hindsight because Nakao modifies the surface of his carbon fibers with electrocoated polymer to enhance compatibility with thermoplastic resins and therefore does not provide guidance or motivation to select

[2] Appellants present substantive arguments addressing claims 1, 3, and 9 together. We limit our discussion to independent claim 1 as representative of the subject matter on appeal.

polypropylene for use with carbon fibers. (App. Br. 7–8). Appellants further argue Hasegawa and Ikeda are silent with respect to presize/size applications according to claim 1. (App. Br. 9).

A complete statement of the rejections on appeal appear in the Final Office Action. (Final Act. 7–15). The Examiner found Hirai describes a composite formed from thermoplastic polyolefin resins and cut carbon fiber bundles which have been impregnated with a sizing agent. (Final Act. 7–8; Hirai col. 7, ll. 15–30). The Examiner found Hirai does not specifically teach that the thermoplastic matrix is polypropylene, polyethylene or a copolymer of propylene and ethylene. (Final Act. 7–8). The Examiner found Hirai discloses using a sizing agent that may be either a thermoplastic resin, a thermosetting resin or a mixture thereof at any proportion including epoxy resins or a polyolefin grafted with maleic acid. (Final Act. 9–10; Hirai col. 4, ll. 7–21 and col 7, ll. 44–45). Hirai discloses the sizing agent can be applied two or more times to the carbon strand utilizing, different types of sizing agents. (Col. 6, ll. 32–34). The Examiner found Nakao describes carbon fibers used in a composite matrix material wherein suitable matrix resins include polypropylene. (Final Act. 8; Nakao col 6, ll. 25–31). The Examiner cited Hasegawa for describing an acid modified polypropylene resin as a sizing agent (binding agent) for an inorganic fiber, including carbon fibers. (Final Act. 11–12). The Examiner cited Ikeda for teaching a carbon fiber bundle having a plurality of wrinkles on their surface. (Final Act. 13–14).

Appellants' arguments are not persuasive of reversible error. Appellants argue Hirai does not disclose or suggest an advantage to application of the pre-size and size coatings according to the sequential order

of claim 1. The claimed invention is directed to a thermoplastic resin composition comprising polypropylene and a cut carbon fiber bundle having fibers which are presized and sized. As stated above, the Examiner found Hirai describes a composite formed from thermoplastic polyolefin resins and cut carbon fiber bundles which have been impregnated with sizing agents in multiple steps. The Examiner has provided factual basis from the cited references for selecting the resin matrix and sizing agents required by the claimed invention. Appellants' arguments for patentability are premised on the method by which the claimed thermoplastic resin has been formed. However, it has long been held that "'[i]f the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.'" *SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1317 (Fed. Cir. 2006) (quoting *In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985)). Appellants have not directed us to evidence that establishes the thermoplastic resin formed by the steps outlined in claim 1 result in a patentably distinct product.

Appellants' arguments regarding Hirai failure to disclose the application of an epoxy pre-size dried coating and subsequent application of a size coating are without persuasive merit. As set forth above, the Examiner determined that Hirai discloses the sizing agent can be applied in multiple steps. The Examiner also found Hirai discloses the used of different sizing agents including epoxy resins and a polyolefin grafted with maleic acid.

Appellants argue the Examiner's reason for selecting polypropylene from the disclosure of Nakao was based on hindsight is not persuasive.

Contrary to Appellants' arguments, a person of ordinary skill in the art would have recognized the suitability of selecting polypropylene as a matrix resin used with carbon fibers as exhibited by Nakao. It is first noted that Hirai discloses the suitability of using polyolefins for the resin matrix. Nakao is further evidence of the suitability of utilizing polypropylene as a matrix resin. Moreover, the present Specification indicates the prior art has taken interests in utilizing polypropylene resin as a matrix material with carbon fibers. (Spec. 2–3).

Appellants' arguments regarding Hasegawa and Ikeda's failure to describe presize/size applications according to claim 1 are not persuasive because they do not address the reasons the Examiner cited these references.

Appellants rely on the tables in the Specification as evidence that "[t]he element of pre-size application followed by drying and then sizing is an element of the present invention that provides significant improvement in performance." (App. Br. 9–10).

We find no evidence proffered by the Appellants, which indicates that the asserted significant improvement in performance results are derived from either a direct or an indirect comparison between the claimed subject matter and the closest prior art, namely Hirai. *In re Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991); *In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984). Also, it is not clear from the showing relied upon in the Specification whether the asserted improvement in performance results are due to the employment of the claimed pre-sizing agent consisting of an epoxy resin or the combination forming the pre-sizing agents discussed on pages 36–37 of the Specification (i.e., Epikote 828, Epikote 1001 and Pluronic F88). *In re Heyna*, 360 F.2d 222, 228 (CCPA 1966); *In re Dunn*,

349 F.2d 433, 439 (CCPA 1965) ("While we do not intend to slight the alleged improvements, we do not feel it an unreasonable burden on appellants to require comparative examples relied on for non-obviousness to be truly comparative. The cause and effect sought to be proven is lost here in the welter of unfixed variables."). Moreover, the showing referred to in the Specification is not commensurate in scope with the protection sought by the claims on appeal.

Under these circumstances, it cannot be said that the Appellants have demonstrated that the claimed subject matter achieves unexpected results relative to Hirai. *In re Freeman*, 474 F.2d 1318, 1324 (CCPA 1973).

*Rejection II*

Appellants argue the addition of the teachings of Kume to Hirai— as proposed by the Examiner—would change Hirai's principle of operation because "[a]llowing the strands to remain moist during the cutting or rewetting them would allow the twist to 'unwind' during cutting and the configuration applied by Hirai would be lost." (App. Br. 11).

Appellants' arguments do not establish error in the Examiner's obviousness rejection. The Examiner has established that it was known to chop carbon fiber bundles having a moisture content required by the claimed invention. (Ans. 10; Final Act. 15). As such, a person of ordinary skill in the art would have recognized the suitability of chopping carbon fiber bundles either try or with a higher moisture content as described by Kume. Appellants have not directed us to evidence that establishes that the utilization of a higher moisture content would have resulted in unwinding of the carbon fiber bundles.

Accordingly, we sustain the rejection of claims 1, 3, 9, and 10 under 35 U.S.C. § 103(a).

## CONCLUSION

The obviousness rejections I and II are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

## AFFIRMED